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(54)【発明の名称】　熱接着性複合繊維、これを用いた不織布及び吸収性物品

(57)【要約】

【課題】　低温、高速の熱処理によっても高強度で風合いのソフトな不織布が得られ、かつ、隠蔽性に優れた熱接着性複合繊維、この繊維を使用して得られた不織布、及びこの不織布を用いた吸収性物品を提供すること。

【解決手段】　結晶性ポリプロピレンとポリエチレンからなる熱接着性複合繊維であって、該複合繊維の断面は高融点樹脂が中央部から外側に向かってストランドが放射状に伸びる分岐部を形成し、かつ低融点樹脂が分岐部と接続して接続部を形成した異形構造であることを特徴とする熱接着性複合繊維、及びそれを用いた不織布と吸収性物品。

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【特許請求の範囲】

【請求項１】　結晶性ポリプロピレンまたはプロピレン系の共重合体から選ばれた少なくとも１種の高融点樹脂のＡ成分と、これより低融点で密度が０．９１０～０．９７０ｇ／ｃｍ'であるポリエチレン系の低融点樹脂のＢ成分とから形成された熱接着性複合繊維であって、該複合繊維の断面は高融点樹脂のＡ成分が中央部から外側に向かってストランドが放射状に伸びる分岐部を形成し、かつ低融点樹脂のＢ成分が該Ａ成分の分岐部と接続して接続部を形成する異形構造であることを特徴とする熱接着性複合繊維。

【請求項２】　プロピレン系の共重合体成分が、プロピレン８５～９９重量％と、エチレン１～１５重量％の二元系共重合体樹脂である請求項１に記載の熱接着性複合繊維。

【請求項３】　プロピレン系の共重合体成分が、プロピレン５０～９９重量％と、ブテン－１　１～５０重量％の二元系共重合体樹脂である請求項１に記載の熱接着性複合繊維。

【請求項４】　プロピレン系の共重合体成分が、プロピレン８４～９８重量％、エチレン１～１０重量％、ブテン－１　１～１５重量％の三元系共重合体樹脂である請求項１に記載の熱接着性複合繊維。

【請求項５】　高融点樹脂と接続する低融点樹脂の接触割合が、該低融点樹脂の全周長の１０～５０％である請求項１～４のいずれかに記載の熱接着性複合繊維。

【請求項６】　請求項１～５のいずれかに記載の熱接着性複合繊維の繊維交差点が熱接合された短繊維不織布。

【請求項７】　請求項１～５のいずれか１項に記載の熱接着性複合繊維の繊維交差点が熱接合された長繊維不織布。

【請求項８】　請求項６または７のいずれか１項に記載の不織布を少なくとも一部に用いた吸収性物品。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は異形断面を有する熱接着性複合繊維及びこれを用いた不織布と吸収性物品に関する。更に詳しくは不織布化工程の熱処理温度が低く、かつ、隠蔽性に優れたポリオレフィン系の異形断面を有する熱接着性複合繊維及びこれを用いた不織布と吸収性物品に関するものである。

【０００２】

【従来の技術】低融点樹脂を鞘成分とし、高融点樹脂を芯成分とする熱接着性複合繊維を用いた不織布は風合い（触感）や不織布強力等の特性が好まれ、紙おむつや生理用品等の衛生材料の表面材として使用されている。このような不織布は、短繊維の場合、通常、熱接着性複合繊維をカード工程や空気流開繊工程によってウエブとした後、加熱処理や加圧処理によって鞘成分を溶融し、繊維交絡点を融着する事によって作製される。一方、長繊

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維の代表としては、スパンボンド法によって容易に製造することができる。通常、紡糸口金より吐出した長繊維群をエアーサッカーなどに導入して牽引延伸し、開繊して捕集コンベヤー上に集積してウェブを得た後、加圧処理によって鞘成分を溶融し、繊維交絡点を融着する事によって作成される。繊維交絡点を融着する方式は、加熱エンボスロール等による熱圧着方式と、サクションバンドドライヤーやサクションドラムドライヤー等による熱風接着方式とに大別する事ができる。それぞれの方式により作製される不織布は、ポイントボンド不織布、スルーエアー不織布と呼ばれ用途に応じて使い分けられる。

【０００３】このような熱接着性（鞘／芯）複合繊維として知られているものには、例えばポリエチレン／ポリプロピレン系複合繊維（以下、ＰＥ／ＰＰと略記する）［特公昭５２－３７０９７号公報］、ポリエチレン／ポリエステル系複合繊維（ＰＥ／ＰＥＴ）［特公平３－２１６４８号公報］、プロピレン系共重合体から成る鞘成分にポリプロピレンから成る芯成分が複合された繊維（ｃｏ－ＰＰ／ＰＰ）［特公昭５５－２６２０３号公報］を挙げる事が出来る。これらの中で、特にＰＥ／ＰＰは鞘側を構成する樹脂と芯側を構成する樹脂の融点差が大きく、加工温度幅が広い。加えて、その風合いとサラサラとした触感が好まれ、ＰＥ／ＰＰで作製した不織布は、紙おむつや生理用品に多く使われている。

【０００４】熱接着性複合繊維を用いて不織布を作製する場合、一般に不織布の風合い（触感）は強力と相反する傾向にある。従来、衛生材料用途の不織布は、十分な強力を有し、かつ、生産速度を極力速くする必要があるため、比較的高い温度での熱処理によって生産される事が多かった。しかし、最近の傾向として衛生材料の表面材用途の不織布には、より柔らかい風合い（触感）が求められるようになってきている。このため、ＰＥ／ＰＰによって作製される不織布についても、柔らかい風合い（触感）を得るために低い熱処理温度で実施される事が多くなってきており、その結果、不織布強力が低くなるという難点が生じている。このため衛生材料用途として、高い強力と柔らかな風合い（触感）の相反する要求を、両方とも満足させる不織布を得る事が可能な、ＰＥ／ＰＰの熱接着性複合繊維の出現が望まれている。

【０００５】また、表面材としての不織布の要求性能としては、例えば、使い捨ておむつ、生理用ナプキンに使用する場合、乳児の排出物や尿による黄色の着色、女性の経血による赤色の着色は使用感に多大な影響を及ぼすため、これらの着色を見え難くする機能であるカバーリング性が、近年の表面材には必要不可欠とされている。このため、従来の不織布に於けるカバーリング性を向上させる方法としては、構成繊維に$TiO_2$等の顔料を含有して白度を向上させる方法があるが、$TiO_2$等の含有量が多すぎると、白度は向上するが繊維の紡糸性、不織布への加工性が悪化し、また、長繊維から短繊維への

切断が困難になり、製造コストが増大する。また、隠蔽性を向上させるために坪量を増加させる方法も提案されているが、該方法では、軽量化、コンパクト化、低コスト化に問題がある。

【０００６】

【発明が解決しようとする課題】本発明の目的は低温・高速の熱処理によっても高強度で風合いのソフトな不織布となり、ヒートシール性が高く、かつ、隠蔽性にも優れる不織布を提供することにあり、そのための手段として特定の樹脂の組み合わせからなる異形断面を有する複合繊維を用いることである。

【０００７】

【課題を解決するための手段】本発明者らは、上記課題を解決すべく鋭意検討を重ねた結果、以下の構成を採用することにより、所期の目的が達成される見通しを得て、本発明を完成するに至った。

（１）　結晶性ポリプロピレンまたはプロピレン系の共重合体から選ばれた少なくとも１種の高融点樹脂のＡ成分と、これより低融点で密度が０．９１０～０．９７０ｇ／ｃｍ³であるポリエチレン系の低融点樹脂のＢ成分とから形成された熱接着性複合繊維であって、該複合繊維の断面は高融点樹脂のＡ成分が中央部から外側に向かってストランドが放射状に伸びる分岐部を形成し、かつ低融点樹脂のＢ成分が該Ａ成分の分岐部と接続して接続部を形成する異形構造であることを特徴とする熱接着性複合繊維。

（２）　プロピレン系の共重合体成分が、プロピレン８５～９９重量%と、エチレン１～１５重量%の二元系共重合体樹脂である（１）に記載の熱接着性複合繊維。

（３）　プロピレン系の共重合体成分が、プロピレン５０～９９重量%と、ブテン－１　１～５０重量%の二元系共重合体樹脂である（１）に記載の熱接着性複合繊維。

（４）　プロピレン系の共重合体成分が、プロピレン８４～９８重量%、エチレン１～１０重量%、ブテン－１　１～１５重量%の三元系共重合体樹脂である（１）に記載の熱接着性複合繊維。

（５）　高融点樹脂と接続する低融点樹脂の接触割合が、該低融点樹脂の全周長の１０－５０%である請求項１～４のいずれかに記載の熱接着性複合繊維。

（６）　（１）～（５）のいずれかに記載の熱接着性複合繊維の繊維交差点が熱接合された短繊維不織布。

（７）　（１）～（５）のいずれかに記載の熱接着性複合繊維の繊維交差点が熱接合された長繊維不織布。

（８）　（６）または（７）のいずれかに記載の不織布を少なくとも一部に用いた吸収性物品。

【０００８】

【発明の実施の形態】以下、本発明を詳細に説明する。本発明で複合繊維の高融点樹脂のＡ成分に使用する結晶性ポリプロピレンとはホモポリプロピレン、若しくはプロピレンを主成分とし、それと少量のエチレン、ブテン－１、ヘキセン－１、オクテン－１若しくは４－メチルペンテン－１等のα－オレフィンとの結晶性共重合体であって、メルトフローレート（以下ＭＦＲ、２３０℃、２．１６ｋｇ）が２～１５０、融点が１５８℃以上のものが好ましい。このような重合体はチーグラー・ナッタ系触媒を用いるプロピレンの重合方法等の公知の方法によって得られる。また、本発明で複合繊維の高融点樹脂のＡ成分に用いるプロピレン系の共重合体とはプロピレンを主成分とし、それと少量のエチレン、ブテン－１、ヘキセン－１、オクテン－１、若しくは４－メチルペンテン－１等のα－オレフィンとの結晶性共重合体であって、ＭＦＲが３～５０、融点は１２０℃～１５８℃であり、好ましい具体例としては、プロピレン９９～８５重量%とエチレン１～１５重量%とからなるプロピレンを主体とするプロピレン・エチレンの二元共重合体、プロピレン９９～５０重量%とブテン－１　１～５０重量%とからなるプロピレンを主体とするプロピレン・ブテンの二元共重合体、あるいはプロピレン８４～９８重量%、エチレン１～１０重量%、およびブテン－１　１～１５重量%からなるプロピレン・エチレン・ブテン－１の三元共重合体であり、このような共重合体はチーグラ・ナッタ触媒を用いたオレフィンの共重合方法等の公知の方法により得ることができる。

【０００９】本発明で複合繊維の低融点樹脂のＢ成分に用いるポリエチレンは通常工業的に利用されているポリエチレンであり、密度が０．９１０～０．９２５ｇ／ｃｍ³の低密度ポリエチレン、同じく０．９２６～０．９４０ｇ／ｃｍ³の中密度ポリエチレン、同じく０．９４１～０．９７０ｇ／ｃｍ³の高密度ポリエチレンであり、好ましくは密度が０．９１５～０．９３５ｇ／ｃｍ³の直鎖状低密度或いは中密度ポリエチレンである。メルトインデックス（以下ＭＩ、１９０℃、２．１６ｋｇ）は２～１００の範囲が好ましい。その中から複合繊維の高融点樹脂のＡ成分との組合せにより、高融点樹脂のＡ成分より、融点が１５℃以上低いポリエチレンを任意で選ぶことができる。

【００１０】本発明の熱接着性複合繊維の断面は、高融点樹脂のＡ成分が中央部から外側に向かって複数のストランドが放射状に伸びる分岐部を形成し、かつ低融点樹脂のＢ成分がＡ成分の分岐部と接続して接続部を形成した異形断面構造である。また、熱接着性複合繊維は、それを構成する低融点樹脂成分の一部が製造工程で剥離すると、熱接着された繊維交差点の数が減少し、その結果接着性が低下し好ましくない。特に本発明の複合繊維は特定の異形断面構造を有するため余計に剥離が起こりやすく、このため複合繊維を構成するＡ、Ｂ両樹脂の接続部の形状が重要となる。つまり、構成するＡ、Ｂの樹脂は分岐部であるＡ成分の先端が好ましくはＢ成分の周長の１０%以上、より好ましくは１５%以上に接触し、接

続部を形成することが好ましい。つまり、複合繊維に外力が加わっても分割しないことが必要である。本発明の熱接着性複合繊維の断面の一例を図１～図４に示す。ただし、以下に説明する繊維断面に限定されるものではない。

【００１１】図１に示した熱接着性複合繊維（ａ１）は高融点樹脂のＡ成分１が中央部から外側に向かって３本のストランドが放射状に伸びる分岐部を形成し、かつ低融点樹脂のＢ成分２が該分岐部の各ストランドの長手方向先端に接続して接続部を形成し、Ａ及びＢ成分の紡糸時における樹脂のＭＦＲ（以下、紡糸ＭＦＲ）を同値とした場合の複合繊維である。

【００１２】図２に示した熱接着性複合繊維（ａ２）は高融点樹脂のＡ成分１が中央部から外側に向かって４本のストランドが放射状に伸びる分岐部を形成し、かつ低融点樹脂のＢ成分２が該分岐部の各ストランドの長手方向先端に接続して接続部を形成し、Ａ及びＢ成分の紡糸ＭＦＲを同値とした場合の複合繊維である。

【００１３】図３に示した熱接着性複合繊維（ａ３）は高融点樹脂のＡ成分１が中央部から外側に向かって４本のストランドが放射状に伸びる分岐部を形成し、かつ低融点樹脂のＢ成分２が該分岐部の各ストランドのほぼ先端部近傍に各ストランド毎にストランドの長手方向とは交差する方向にストランドを隔ててほぼ反対方向に接続して２つの接続部とからなり、Ａ及びＢ成分の紡糸ＭＦＲを同値とした場合の複合繊維である。そしてこの場合、接続部の一方が分岐部のストランドのほぼ先端部近傍の位置に接続しており、もう一方がストランドの先端部よりやや根元寄りの位置に接続している。もちろん両方の接続部がストランドのほぼ同じ位置からストランドを隔ててほぼ反対方向に接続してもよい。

【００１４】図４に示した熱接着性複合繊維（ａ４）は高融点樹脂のＡ成分１が中央部から外側に向かって４本のストランドが放射状に伸びる分岐部を形成し、かつ低融点樹脂のＢ成分２が該分岐部の各ストランドのほぼ先端部近傍に各ストランド毎にストランドの長手方向とは交差する方向にストランドを隔ててほぼ反対方向に接続して２つの接続部とからなり、Ａ及びＢ成分の紡糸ＭＦＲを同値にした場合の複合繊維である。

【００１５】本発明の熱接着性複合繊維は、前述の図１～図４に例示したように、特殊な異形断面構造を有している。即ち、高融点樹脂のＡ成分が外側に向かって細いストランド状に突出して分岐状の骨格を形成し、そのＡ成分の分岐部に低融点樹脂のＢ成分が一部接合して接続部を形成している。つまり、Ｂ成分は、前記Ａ成分との一部接合部を除き大部分の表面は露出している。このような、形態構造の複合繊維が熱処理を受けると、低融点樹脂のＢ成分は、大部分の露出面から熱伝達を受けるのでＢ成分が軟化状態から融着に至るまでの熱伝達が極めて容易になる。特に図５に示すような、通常の鞘芯型やその他の丸断面に比較して低融点樹脂（Ｂ成分）の体積に対する露出表面積の割合が著しく大きいので、表面露出部からの熱伝達が速く融着が均一になる。つまり、低温接着性に優れるようになるのである。この傾向はＢ成分の接続部の表面露出度が大きいほど顕著である。従って、Ａ成分とＢ成分の接続部に対するＢ成分の全周長の接触割合が５０％以下であることが低温接着性の面では好ましく、より好ましくは３０％以下である。

【００１６】本発明でいう低温接着性に優れるということは、図５に示すような通常の丸断面の複合繊維に比較して、本発明の熱接着性繊維は３～４℃以下の低温での熱接着が十分可能となり、かつ、繊維接合点が融着接合ムラを生じることなく、均一な融着接合が行われることを意味する。この結果、本発明の熱接着性複合繊維を用いて低温熱処理して得られた不織布は、繊維間の空隙が多く残存し、極めてソフト感を有する。しかも、繊維同士は繊維接点で確実に熱融着されるので不織布は繊維集合体としての結合力を向上させ、高い強力を有するようになる。これに対し図５の如く、一般の丸断面構造の芯鞘複合繊維では鞘成分全体を十分に溶融させるためには、本発明の複合繊維の場合に比較し、より高温を要する。このような条件下で熱処理が行われると、熱融着による強力は向上するが、反面芯成分も融着温度に近づくため繊維全体を融着させるようになる。この結果、必然的に嵩高が失われ、不織布の風合い（ソフトの触感）が損なわれるのである。

【００１７】また、本発明の熱接着性複合繊維は、中央部から外側に向かって放射状に伸びるストランドが分岐した多葉型構造を有するので、入射光が散乱した反射光が視野に見えるようになる。したがって、本発明の熱接着性複合繊維を不織布、織編物などの布帛としたとき該布帛の下方の色が見えにくい、いわゆる透け防止効果を発揮する。つまり隠蔽性に優れるのである。

【００１８】本発明の熱接着性複合繊維を得るには、短繊維の場合、前述の樹脂Ａ、Ｂ成分を上述の繊維断面に代表される紡糸口金プレートを用い、公知の複合紡糸法により紡糸をする。この際、Ａ及びＢ成分の押出温度を変更することで紡糸ＭＦＲを調整して分岐部と接続部の接触割合を設定する。その後、延伸し、捲縮を付与する。複合繊維を構成するＡ、Ｂ成分は、複合重量比がＡ成分／Ｂ成分＝２０／８０～８０／２０重量%の範囲が好ましい。Ｂ成分が２０%未満では、得られる繊維の熱接着性が低下し、これを用いた不織布も十分な引張強度および低温接着性を得ることが難しくなる。また、Ｂ成分が８０%を超すと、繊維の熱接着性は十分であるが、繊維の熱収縮率が高くなり、不織布を得る際の寸法安定性が低下する傾向がある。複合繊維の繊度は０．５～１０．０ｄ／ｆで、かつ、捲縮数が約３～６０山／２５ｍｍのものがカード通過性がよく、好ましい。一方、長繊維の代表としては、前述の樹脂Ａ、Ｂ成分を上述の繊維

断面に代表される紡糸口金プレートを用い、公知のスパンボンド法により製造することができる。この際、A及びB成分の押出温度を変更することで紡糸ＭＦＲを調整して分岐部と接続部の接触割合を設定する。複合繊維を構成するA、B成分は、複合重量比が、A成分／B成分＝２０／８０～８０／２０重量%の範囲が好ましい。B成分が２０%未満では、得られる繊維の熱接着性が低下し、これを用いた不織布も十分な引張強度および低温接着性を得ることが難しくなる。また、B成分が８０%を超すと、繊維の熱接着性は十分であるが、繊維の熱収縮率が高くなり、不織布を得る際の寸法安定性が低下する傾向がある。複合繊維の繊度は０．５～１０．０d／fのものが、好ましい。又、必要に応じて、捲縮を与えることもできる。

【００１９】本発明の短繊維不織布は、前述複合繊維をカード機を用いて所望の目付のウェブとし、ニードルパンチ法、サクションドライヤー法、あるいは熱ロール法により不織布とする公知の方法で得ることができる。一方、長繊維不織布の代表としては、スパンボンド法により不織布とする公知の方法で得ることができる。このような不織布は、紙おむつあるいは生理用ナプキンの表面材等の分野に有用である。この不織布を紙おむつや生理用ナプキン等に使用する場合には、単糸繊度は０．５～１０．０d／f、不織布の目付けは８～５０g／m²のものが好ましく、より好ましくは１０～３０g／m²である。単糸が０．５d／f未満では、紡糸時の安定した可紡性が得られ難く、ついては均質なウェブを得ることが困難となり、１０．０d／fを超すと不織布の目が粗くなり、これを表面材として使用すれば肌触りに難のあるものとなるので好ましくない。また、目付けが１０g／m²未満では薄すぎて十分な不織布強力が得られず、５０g／m²を超すと好ましい不織布強力が得られるものの肌触りが悪くコスト高になることから実用的でない。

【００２０】

【実施例】以下実施例により本発明を具体的に説明するが、本発明はこれら実施例のみに限定されるものではない。尚、以下に述べる実施例中における各種の物性値は以下の方法で測定したものである。

【００２１】・接触割合

不織布の断面を電子顕微鏡写真で撮影し、熱圧着処理された以外の繊維を観察し、一視野当り１０本を選択する。異形断面の分岐部である高融点樹脂のA成分に接続している低融点樹脂のB成分が接している部分の断面の周長が、同一断面上の該低融点樹脂B成分の断面の全周長との割合であり、分岐数に応じ、その平均を１本当たりの接触割合とし、１０本分の平均を表１に結果を示す。

接触割合（%）＝$A_P$／$B_T$×１００

$A_P$：高融点樹脂A成分に低融点樹脂B成分が接触している部分の周長

$B_T$：同一断面上の該低融点樹脂B成分の全周長

【００２２】・断面形状維持特性：（短繊維）

延伸後の単糸５０本を採取、繊維断面を光学顕微鏡写真で撮影し、一視野に当たり異形断面の高融点樹脂のA成分と低融点樹脂のB成分との接続部形状が９０%以上維持されていれば優、８０%以上維持されていれば良、８０%以下であれば不可と評価し、優を○、良を△、不可を×で示した。表１に結果を示す。

・断面形状維持特性：（長繊維）

不織布の断面を光学顕微鏡写真で撮影し、熱圧着処理された以外の繊維を観察し、一視野に当り異形断面の高融点樹脂のA成分と低融点樹脂のB成分との接続部形状が９０%以上維持されていれば優、８０%以上維持されていれば良、８０%以下であれば不可と評価し、優を○、良を△、不可を×で示した。表１に結果を示す。

【００２３】・隠蔽性（ウェブの白色度）

ウェブ１０gを採取、色差計（ＳＭカラーコンピューター、スガ試験機（株））にて測定、数値が大きい程、隠蔽性が高い。表１に結果を示す。

・隠蔽性（不織布の明暗差）

不織布強力において作成した不織布を用い、該不織布の背後に白タイルと黒タイルを置いて色差計にて明度を測定し、明暗差（△L）を下記式より算出、明暗差の小さいもの程、隠蔽性が高い。表１に結果を示す。

明暗差（△L）＝$L^*_w$－$L^*_b$

$L^*_w$：白タイルに不織布を重ねた時の明度

$L^*_b$：黒タイルに不織布を重ねた時の明度

【００２４】・不織布強力：不織布の機械の流れ方向（ＭＤ）を長さ方向とし、機械の流れ方向に直角な方向（ＣＤ）を幅方向として、長さ１５ｃｍ、幅５ｃｍの試料片を作製し、引張り試験機を用い、つかみ間隔１０ｃｍ、引張り速度１０ｃｍ／ｍｉｎで引張り強力を測定した。

・不織布風合：５人のパネラーによる官能試験を行い、全員がソフトであると判断した場合を優、３名以上がソフトであると判断した場合を良、３名以上がソフト感に欠けると判断した場合を不可と評価し、優を○、良を△、不可を×で示した。

【００２５】・ヒートシール性：上記、不織布強力の測定に用いる不織布から、不織布の機械の流れ方向（ＭＤ）を長さ方向とし、機械の流れ方向に直角な方向（ＣＤ）を幅方向として、長さ７．５ｃｍ、幅２．５ｃｍの試料片を切り出し、同種の不織布同士の先端部分を長さ１ｃｍだけ重ね合わせ、３ｋｇ／ｃｍ²の加圧下で１秒間、所定の温度で熱圧着させ、引張り試験機を用い、つかみ間隔１０ｃｍ、引張り速度１０ｃｍ／ｍｉｎでヒートシール部の剥離強力を測定する。

【００２６】実施例１、比較例１

密度が０．９５９、ＭＩが１３の高密度ポリエチレンを

B成分とし、ＭＦＲが１０の結晶性ポリプロピレン（ホモポリマー）をＡ成分として、図１に示した繊維断面を与える紡糸口金を用い、接触割合を２０％目標に設定したもの（実施例１）、および図５（比較例１）に示した繊維断面を与える紡糸口金を用いて複合紡糸装置により、複合重量比４０／６０（Ｂ成分／Ａ成分）、単糸繊度が４ｄ／ｆの未延伸糸を得た。その後、９５℃の熱ロールにて２．４倍に延伸し、スタッファボックスで機械捲縮を付与し、９０℃で乾燥した後、切断処理して２ｄ×３８ｍｍの複合繊維を得た。この複合繊維を用いて、温度１１６℃（実施例１）、１２０℃（比較例１）に加熱された凸部面積２４％のエンボスロールとフラットな金属ロールからなる熱圧着装置を用い、線圧２０ｋｇ／ｃｍ、速度６ｍ／ｍｉｎの条件でカード法ウェブを熱処理し、目付け約２０ｇ／ｍ²の不織布とした。さらに、この不織布を大人用おむつの表面材として使用したところ、実施例１については、白度、肌触り（ソフト感）で優れ、かつ、不織布強力、ヒートシール性にも優れていたが、比較例１については、白度が劣り、かつ、不織布強力、ヒートシール性が実施例１より劣り、吸収性物品への適否の差異は明確であった。

【００２７】実施例２～３

密度が０．９１８、ＭＩが２４の直鎖状低密度ポリエチレンをＢ成分として、エチレン３重量%、ブテン－１５重量%、及びプロピレン９２重量%からなり、ＭＦＲが１５である三元共重合体をＡ成分として、図３（実施例２）および図４（実施例３）に示した繊維断面を与える紡糸口金を用い、接触割合を２５％目標に設定し、実施例１と同様な方法にて２ｄ×３８ｍｍの複合繊維を得た。この複合繊維を用いて、温度１１６℃に加熱された凸部面積２４％のエンボスロールとフラットな金属ロールからなる熱圧着装置を用い、線圧２０ｋｇ／ｃｍ、速度６ｍ／ｍｉｎの条件でカード法ウェブを熱処理し、目付け約２０ｇ／ｍ²の不織布とした。

【００２８】実施例４

密度が０．９５９、ＭＩが１３の高密度ポリエチレンをＢ成分とし、ＭＦＲが１０の結晶性ポリプロピレン（ホモポリマー）をＡ成分として、図１に示した繊維断面を与える紡糸口金を用い、接触割合を低めに設定し、実施例１と同様な方法にて２ｄ×３８ｍｍの複合繊維を得た。尚、実施例４は実施例１と同様の繊維断面を与える紡糸口金を使用し、低融点樹脂の接触割合が、該低融点樹脂の全周長の１２％となった例であるが、低温加工性の向上はそれ程見られないが、その他の特性では優れるものであった。

【００２９】比較例２

密度が０．９１８、ＭＩが２４の直鎖状ポリエチレンをＢ成分として、ＩＶ値０．４９のポリエチレンテフタレートをＡ成分として、図２に示した繊維断面を与える紡糸口金を用い、接触割合を３０％目標に設定し、実施例１と同様な方法にて２ｄ×３８ｍｍの複合繊維を得た。この複合繊維は、延伸後Ａ／Ｂ成分が剥離分割し、評価の対象とならなかった。

【００３０】実施例５、比較例３

密度が０．９３５、ＭＩが２０の直鎖状中密度ポリエチレンをＢ成分として、ブテン－１　５重量%とプロピレン９５重量%とからなり、ＭＦＲが１５である二元共重合体をＡ成分として、図１に示した繊維断面を与える紡糸口金を用い、接触割合を２０％目標に設定したもの（実施例５）、および図５（比較例３）に示した所定の繊維断面口金を用い、紡糸口金から吐出した複合繊維群をエアーサッカーに導入して牽引延伸し、複合長繊維を得、続いて、エアーサッカーより排出された前記長繊維群を、帯電装置により同電荷を付与せしめ帯電させた後、反射板に衝突させて開繊し、開繊した長繊維群を裏面に吸引装置を設けた無端ネット状コンベヤー上に、長繊維ウェブとして捕集する。捕集した長繊維ウェブは、無端コンベヤーに載せられたまま搬送され、温度１１２℃に加熱された凸部面積２４％のエンボスロールとフラットな金属ロールからなる熱圧着装置を用い、線圧２０ｋｇ／ｃｍ、速度３０ｍ／ｍｉｎの条件で熱処理し、目付け約２０ｇ／ｍ²の不織布とした。さらに、この不織布を大人用おむつの表面材として使用したところ、実施例５については、白度、肌触り（ソフト感）で優れ、かつ、不織布強力、ヒートシール性にも優れていたが、比較例３については、白度が劣り、かつ、不織布強力、ヒートシール性が実施例４より劣り、吸収性物品への適否の差異は明確であった。

【００３１】《不織布強力、不織布風合、不織布の明暗差およびヒートシール性》断面形状維持特性において、良（△）以上のサンプルについて評価。短繊維不織布は各繊維をローラーカード機にて２０ｍ／ｍｉｎの速度でカーディングし、それぞれ目付け約２０ｇ／ｍ²のウエブとした。続いて同一速度で接着面積率２４％のエンボスロールを用いて所定温度にて不織布に加工した。それぞれの物性結果を表１に示す。一方、長繊維不織布は、スパンボンド法にて製造した。目付け約２０ｇ／ｍ²のウェブを接着面積率２４％のエンボスロールを用いて所定温度にて不織布に加工した。それぞれの物性結果を表１に示す。

【００３２】

【表１】

表１

| | レジン組合せ A成分／B成分 | 繊維断面構造 | 接触割合 % | 断面形状維持特性 | 隠蔽性 白度 | 不織布性能（ＣＤ強力） 加工温度 ℃ | 目付 g／m² | 強力 g／5cm | 風合 | 隠蔽性 明暗差 ⊿L | ヒートシール性能 温度 ℃ | 強力 g／2.5cm |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 実施例１ | PP-1／PE | 図１ | ２０ | ○ | 93.5 | １１６ | 20.5 | １２００ | ○ | 30.5 | １２０ | ２５００ |
| 比較例１ | PP-1／PE | 図５ | | | 90.0 | １２０ | 21.3 | ９００ | △ | 40.8 | １２５ | ２２００ |
| 実施例２ | PO-2／PE | 図３ | ２５ | ○ | 94.0 | １１６ | 20.2 | １１００ | ○ | 27.8 | １２０ | ２７３０ |
| 実施例３ | PO-2／PE | 図４ | ２６ | ○ | 94.5 | １１６ | 20.0 | １２００ | ○ | 27.5 | １２０ | ２８５０ |
| 実施例４ | PP-1／PE | 図１ | １２ | △ | 93.0 | １２０ | 20.5 | １２００ | △～○ | 30.2 | １２５ | ２７００ |
| 比較例２ | PP-1／PET | 図２ | ３０ | × | 93.3 | 延伸後の断面形状でＡ／Ｂ成分が分割し、製品として適当でない | | | | | | |
| 実施例５ | PO-1／PE | 図１ | １９ | ○ | 93.0 | １１２ | 20.0 | １３００ | ○ | 30.0 | １２０ | ３２００ |
| 比較例３ | PO-1／PE | 図５ | | | 90.5 | １１６ | 20.5 | １２５０ | × | 39.0 | １２５ | ２７００ |

表１において、ｐｐ－１はホモポリプロピレンを、ＰＯ－１はプロピレン／ブテン－１二元系共重合体を、ＰＯ－２はプロピレン／エチレン／ブテン－１三元系共重合体を、ＰＥはポリエチレンを、ＰＥＴはポリエチレンテレフタレートをそれぞれ表わす。

【００３３】

【発明の効果】本発明の異形断面を有する熱接着性複合繊維は、低温で、かつ、短時間の熱処理により不織布強力の大きな不織布が作成できる。また、この熱接着性複合繊維を使用した不織布は、風合いがソフトである。しかも、隠蔽性にも優れている。このような不織布は、紙おむつ及び生理用ナプキンの表面材等の分野に有用である。

＊【図面の簡単な説明】

【図１】、本発明の熱接着性複合繊維の繊維断面図の例示である。

【図２】本発明の熱接着性複合繊維の繊維断面図の例示である。

【図３】本発明の熱接着性複合繊維の繊維断面図の例示である。

【図４】本発明の熱接着性複合繊維の繊維断面図の例示である。

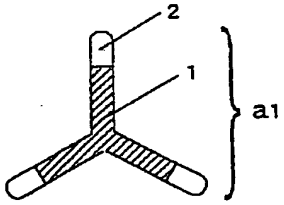
【図５】比較例の熱接着性複合繊維の断面図である。

【符号の説明】

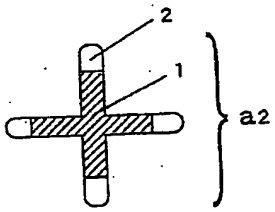
１　高融点樹脂部（Ａ成分）

＊　２　低融点樹脂部（Ｂ成分）

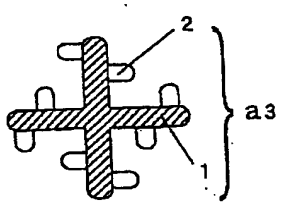
【図１】



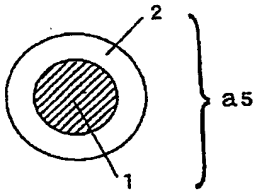

【図２】



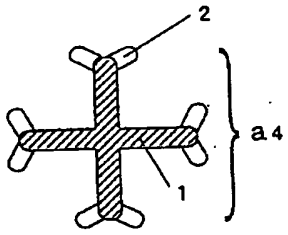

【図３】




【図５】



【図４】

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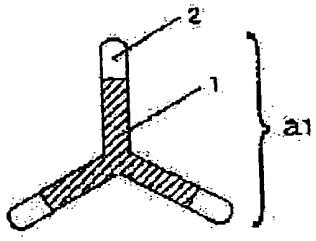
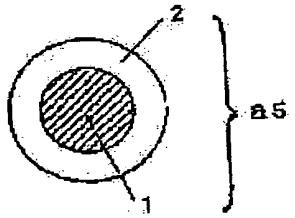
HORIUCHI SHINGO

## (54) THERMALLY BONDABLE CONJUGATE FIBER, NONWOVEN FABRIC AND ABSORBING ARTICLE USING THE SAME

(57)Abstract:
PROBLEM TO BE SOLVED: To obtain a conjugate fiber composed of a high-melting resin component such as a crystalline polypropylene, etc., and a polyethylene-based low- melting resin component, having a section of a modified structure forming specific connected parts, a low heat treatment temperature in a nonwoven fabric formation process and excellent opacifying properties, useful for a nonwoven fabric and an absorbing article.
SOLUTION: This fiber comprises (A) a component A 1 of at least one high- melting resin selected from a crystalline polypropylene and a propylene-based copolymer [preferably a copolymer resin of 85-99 wt.% of propylene and 1-15 wt.% of ethylene or a terpolymer resin of 84-98 wt.% of propylene, 1-10 wt.% of ethylene and 1-15 wt.% of butene-1] and (B) a component B 2 composed of a polyethylene-based resin having a melting point lower than that of the component A and 0.910-9.70 g/cm3 density, has a section of a modified structure in which the component A makes a strand radiately extend from the central part outward to form branched parts and the component B 2 is bonded to the branched parts of the component A to form connected parts.

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CLAIMS

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[Claim(s)]
[Claim 1] A component of at least one sort of high-melting resin chosen from the copolymer of crystalline polypropylene or a propylene system, It is the heat adhesive property bicomponent fiber formed at the low-melt point point from this from B component of the low-melt point point resin of the polyethylene system 0.910-0.970g /of whose consistencies is [ cm ] 3. The cross section of this bicomponent fiber is a heat adhesive property bicomponent fiber with which A component of high-melting resin is characterized by being the variant structure of forming the tee to which a strand is extended to a radial, and B component of low-melt point point resin connecting with the tee of these A components, and forming a connection toward a center section to an outside.
[Claim 2] the copolymer component of a propylene system -- 85 - 99 % of the weight of propylenes, and the duality of 1 - 15 % of the weight of ethylene -- the heat adhesive property bicomponent fiber according to claim 1 which is the system copolymer resin.
[Claim 3] the copolymer component of a propylene system -- 50 - 99 % of the weight of propylenes, and butene-1 1 - 50% of the weight of duality -- heat adhesive property bicomponent fiber according to claim 1 which is the system copolymer resin.
[Claim 4] The copolymer component of a propylene system is 84 - 98 % of the weight of propylenes, 1 - 10 % of the weight of ethylene, and butene-1. Heat adhesive property bicomponent fiber according to claim 1 which is 1 - 15% of the weight of the ternary system copolymer resin.
[Claim 5] The heat adhesive property bicomponent fiber according to claim 1 to 4 whose contact rate of the low-melt point point resin linked to high-melting resin is 10 - 50% of the perimeter length of this low-melt point point resin.
[Claim 6] The staple fiber nonwoven fabric with which the thermal bond of the fiber crossing of a heat adhesive property bicomponent fiber according to claim 1 to 5 was carried out.
[Claim 7] The continuous glass fiber nonwoven fabric with which the thermal bond of the fiber crossing of the heat adhesive property bicomponent fiber of a publication was carried out to any 1 term of claims 1-5.
[Claim 8] Absorptivity goods which used the nonwoven fabric given in any 1 term of claims 6 or 7 at least for the part.

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## DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the nonwoven fabric and absorptivity goods using the heat adhesive property bicomponent fiber and this which have a variant cross section. Furthermore, in detail, the heat treatment temperature of a nonwoven fabric chemically-modified degree is low, and is related with the nonwoven fabric and absorptivity goods using the heat adhesive property bicomponent fiber and this which have the variant cross section of the polyolefine system excellent in concealment nature.
[0002]
[Description of the Prior Art] As for the nonwoven fabric using the heat adhesive property bicomponent fiber which uses low-melt point point resin as a sheath component, and uses high-melting resin as a heart component, properties, such as aesthetic property (tactile feeling) and nonwoven fabric strength, are used as facing of hygienic goods, such as good rareness, a disposable diaper, and sanitary items. After usually making a heat adhesive property bicomponent fiber into a web according to a card process or an airstream filamentation process in the case of a staple fiber, such a nonwoven fabric fuses a sheath component by heat-treatment or pressure treatment, and is produced by welding a fiber confounding point. On the other hand, as a representative of continuous glass fiber, it can manufacture easily by the span bond method. Usually, after introduce into the Ayr soccer etc. the continuous glass fiber group breathed out from the spinneret, carrying out towage extension, opening, being accumulated on an uptake conveyor and obtaining a web, a sheath component is fused by pressure treatment and it is created by welding a fiber confounding point. The method which welds a fiber confounding point can be divided roughly into the thermocompression bonding method by a heating embossing roll etc., and a hot blast adhesion method with a suction band dryer, a suction drum dryer, etc. The nonwoven fabric produced by each method is called a point bond nonwoven fabric and a through air nonwoven fabric, and is properly used according to an application.
[0003] For example, polyethylene / polypropylene system bicomponent fiber (it is hereafter written as PE/PP) [JP,52-37097,B] polyethylene / polyester system bicomponent fiber (PE/PET) [JP,3-21648,B], and the fiber (co-PP/PP) [JP,55-26203,B] with which the heart component which changes from polypropylene to the sheath component which consists of a propylene system copolymer was compounded can be mentioned to what is known as such a heat adhesive property (sheath/heart) bicomponent fiber. In these, especially PE/PP has the large melting point difference of the resin which constitutes a sheath side, and the resin which constitutes a heart side, and its working temperature width of face is wide. In addition, many nonwoven fabrics to a disposable diaper or sanitary items which tactile feeling made dry [ the / aesthetic property and dry one ] produced by good rareness and PE/PP are used.
[0004] When producing a nonwoven fabric using a heat adhesive property bicomponent fiber, generally the aesthetic property (tactile feeling) of a nonwoven fabric is in the inclination which conflicts that it is powerful. Since the nonwoven fabric of a hygienic-goods application had sufficient strength and needed to make a production rate quick as much as possible conventionally, it was produced by heat treatment at comparatively high temperature in many

cases. However, the nonwoven fabric of the facing application of hygienic goods is increasingly asked for softer aesthetic property (tactile feeling) as a recent trend. For this reason, the difficulty that carry out more often with low heat treatment temperature in order to obtain soft aesthetic property (tactile feeling), consequently nonwoven fabric strength becomes low also about the nonwoven fabric produced by PE/PP has arisen. For this reason, as a hygienic-goods application, an appearance of the heat adhesive property bicomponent fiber of PE/PP which can obtain the nonwoven fabric to which both satisfy the high conflicting requirement of as soft aesthetic property (tactile feeling) as powerful is desired.

[0005] Moreover, as a military requirement of the nonwoven fabric as facing, when using it for a disposable diaper and a sanitary napkin, coloring of the yellow by a suckling's excretions and urine and coloring of the red by female menstrual blood are made indispensable [ the covering nature which is the function make it hard to be visible in these coloring ] to facing in recent years, for example in order to have great effect on a feeling of use. For this reason, although there is a method of containing the pigment of TiO2 grade for configuration fiber, and raising white degree as an approach of raising the covering nature in the conventional nonwoven fabric, if there are too many contents of TiO2 grade, although white degree improves, the spinning nature of fiber and the workability to a nonwoven fabric will get worse, and cutting to a staple fiber from continuous glass fiber will become difficult, and a manufacturing cost will increase. Moreover, although the approach to which a basis weight is made to increase is also proposed in order to raise concealment nature, by this approach, a problem is in lightweight-izing, miniaturization, and low cost-ization.

[0006]

[Problem(s) to be Solved by the Invention] The purpose of this invention serves as a soft nonwoven fabric of aesthetic property with high intensity also by heat treatment of low temperature and a high speed, and its heat-sealing nature is high, and it is using the bicomponent fiber which has the variant cross section which is to offer the nonwoven fabric which is excellent also in concealment nature, and consists of combination of specific resin as a means for it.

[0007]

[Means for Solving the Problem] As a result of repeating examination wholeheartedly that the above-mentioned technical problem should be solved, by adopting the following configurations, this invention persons acquire the prospect that the desired end is attained, and came to complete this invention.

(1) A component of at least one sort of high-melting resin chosen from the copolymer of crystalline polypropylene or a propylene system, It is the heat adhesive property bicomponent fiber formed at the low-melt point point from this from B component of the low-melt point point resin of the polyethylene system 0.910-0.970g /of whose consistencies is [ cm ] 3. The cross section of this bicomponent fiber is a heat adhesive property bicomponent fiber with which A component of high-melting resin is characterized by being the variant structure of forming the tee to which a strand is extended to a radial, and B component of low-melt point point resin connecting with the tee of these A components, and forming a connection toward a center section to an outside.

(2) the copolymer component of a propylene system -- 85 - 99 % of the weight of propylenes, and the duality of 1 - 15 % of the weight of ethylene -- a heat adhesive property bicomponent fiber given in (1) which is the system copolymer resin.

(3) the copolymer component of a propylene system -- 50 - 99 % of the weight of propylenes, and butene-1 1 - 50% of the weight of duality -- heat adhesive property bicomponent fiber given in (1) which is the system copolymer resin.

(4) The copolymer component of a propylene system is 84 - 98 % of the weight of propylenes, 1 - 10 % of the weight of ethylene, and butene-1. Heat adhesive property bicomponent fiber given in (1) which is 1 - 15% of the weight of the ternary system copolymer resin.

(5) The heat adhesive property bicomponent fiber according to claim 1 to 4 whose contact rate of the low-melt point point resin linked to high-melting resin is 10-50% of the perimeter length of this low-melt point point resin.

(6) (1) Staple fiber nonwoven fabric with which the thermal bond of the fiber crossing of the heat adhesive property bicomponent fiber of a publication was carried out to either of - (5).
(7) (1) Continuous glass fiber nonwoven fabric with which the thermal bond of the fiber crossing of the heat adhesive property bicomponent fiber of a publication was carried out to either of - (5).
(8) Absorptivity goods which used the nonwoven fabric given in either (6) or (7) at least for the part.
[0008]
[Embodiment of the Invention] Hereafter, this invention is explained to a detail. Gay polypropylene or a propylene is used as a principal component, the crystalline polypropylene used for A component of the high-melting resin of a bicomponent fiber by this invention is a crystalline copolymer with the alpha olefin of it, little ethylene, butene-1, a hexene 1, octene 1, or 4-methyl pentene 1 grade, and 2-150, and the melting point of a melt flow rate (Following MFR, 230 degrees C, 2.16kg) are [ a thing 158 degrees C or more ] desirable [ polypropylene ]. Such a polymer is obtained by well-known methods of using a Ziegler Natta system catalyst, such as a polymerization method of a propylene. Moreover, a propylene is used as a principal component with the copolymer of a propylene system used for A component of the high-melting resin of a bicomponent fiber by this invention. It is a crystalline copolymer with the alpha olefin of it, little ethylene, butene-1, a hexene 1, octene 1, or 4-methyl pentene 1 grade. MFR of 3-50, and the melting point is 120 degrees C - 158 degrees C. As a desirable example the duality of the propylene ethylene which makes a subject 99 - 85 % of the weight of propylenes, and the propylene which consists of 1 - 15 % of the weight of ethylene -- a copolymer -- 99 - 50 % of the weight of propylenes, and butene-1 the duality of the propylene butene which makes a subject the propylene which consists of 1 - 50 % of the weight -- a copolymer -- Or 84 - 98 % of the weight of propylenes, 1 - 10 % of the weight of ethylene, butene-1 It is the ternary polymerization object of propylene ethylene butene-1 which consists of 1 - 15 % of the weight. Such a copolymer can be obtained by the approach that the copolymerization approach of an olefin of having used Ziegler-Natta catalyst etc. is well-known.
[0009] the polyethylene with which the polyethylene used for B component of the low-melt point point resin of a bicomponent fiber by this invention is usually used industrially -- it is -- a consistency -- the low density polyethylene of 0.910 - 0.925 g/cm3 -- the same -- the medium density polyethylene of 0.926 - 0.940 g/cm3 -- similarly it is high density polyethylene of 0.941 - 0.970 g/cm3, and a consistency is the straight chain-like low consistency of 0.915 - 0.935 g/cm3, or medium density polyethylene preferably. The range of a melt index (Following MI, 190 degrees C, 2.16kg) of 2-100 is desirable. With combination with A component of the high-melting resin of a bicomponent fiber, from A component of high-melting resin, it is arbitrary and polyethylene with the melting point low 15 degrees C or more can be chosen from the inside.
[0010] A component of high-melting resin of the cross section of the heat adhesive property bicomponent fiber of this invention is the variant cross-section structure which formed the tee to which two or more strands are extended to a radial, and B component of low-melt point point resin connected with the tee of A component, and formed the connection toward a center section to the outside. Moreover, if a part of low-melt point point resinous principle which constitutes it exfoliates in a production process, the number of the fiber crossings by which heat adhesion was carried out decreases, and, as a result, an adhesive property falls and is not desirable [ a heat adhesive property bicomponent fiber ]. Since it has specific variant cross-section structure, exfoliation tends to take place too many, and especially the bicomponent fiber of this invention becomes important [ the configuration of the connection of A which constitutes a bicomponent fiber for this reason and B car resin ]. That is, the tip of A component which is a tee is desirable, and the resin of A and B to constitute has the desirable thing of the perimeter of B component for which it contacts to 15% or more more preferably, and a connection is formed 10% or more. That is, it is required not to divide, even if external force joins a bicomponent fiber. An example of the cross section of the heat adhesive property bicomponent fiber of this invention is shown in drawing 1 - drawing 4 . However, it is not limited to the fiber cross section explained below.

[0011] The heat adhesive property bicomponent fiber (a1) shown in drawing 1 is a bicomponent fiber at the time of the A component 1 of high-melting resin having formed the tee to which three strands are extended to a radial toward the outside from the center section, and the B component 2 of low-melt point point resin connecting at the tip of a longitudinal direction of each strand of this tee, forming a connection, and making MFR (the following, spinning MFR) of the resin at the time of the spinning of A and B component into the equivalent.
[0012] The heat adhesive property bicomponent fiber (a2) shown in drawing 2 is a bicomponent fiber at the time of the A component 1 of high-melting resin having formed the tee to which four strands are extended to a radial toward the outside from the center section, and the B component 2 of low-melt point point resin connecting at the tip of a longitudinal direction of each strand of this tee, forming a connection, and making spinning MFR of A and B component into the equivalent.
[0013] As for the heat adhesive property bicomponent fiber (a3) shown in drawing 3 , the A component 1 of high-melting resin forms the tee to which four strands are extended to a radial toward a center section to an outside. And the B component 2 of low-melt point point resin separates a strand in the direction of each strand of this tee which intersects the longitudinal direction of a strand for every strand near the point mostly, connects with an opposite direction mostly, and consists of two connections. It is a bicomponent fiber at the time of making spinning MFR of A and B component into the equivalent. and this case -- one side of a connection -- the strand of a tee -- it has connected with the location near the point mostly, and another side has connected with the location of root approach a little from the point of a strand. Of course, both connections may separate a strand from the almost same location of a strand, and may connect with an opposite direction mostly.
[0014] As for the heat adhesive property bicomponent fiber (a4) shown in drawing 4 , the A component 1 of high-melting resin forms the tee to which four strands are extended to a radial toward a center section to an outside. And the B component 2 of low-melt point point resin separates a strand in the direction of each strand of this tee which intersects the longitudinal direction of a strand for every strand near the point mostly, connects with an opposite direction mostly, and consists of two connections. It is a bicomponent fiber at the time of making spinning MFR of A and B component into the equivalent.
[0015] The heat adhesive property bicomponent fiber of this invention has special variant cross-section structure, as illustrated to above-mentioned drawing 1 - drawing 4 . That is, A component of high-melting resin projects in the shape of [ thin ] a strand toward an outside, and forms the frame of the letter of branching, a part of B component of low-melt point point resin joins to the tee of the A component, and the connection is formed. that is, B component -- said a part of A component -- most front faces are exposed except for a joint. If such a bicomponent fiber of gestalt structure receives heat treatment, since B component of low-melt point point resin receives heat transfer from most exposures, heat transfer until B component results [ from a softening condition ] in welding will become very easy. Since the rate of exposure surface area to the volume of low-melt point point resin (B component) is remarkably large as compared with the round-head cross section of the usual sheath-core type or others as shown especially in drawing 5 , welding becomes [ heat transfer from a surface outcrop ] quick homogeneity. That is, it comes to excel in a low-temperature adhesive property. This inclination is so remarkable that whenever [ surface exposure / of the connection of B component ] is large. Therefore, it is desirable that the contact percentage of the perimeter length of B component to the connection of A component and B component is 50% or less in respect of a low-temperature adhesive property, and it is 30% or less more preferably.
[0016] It means that uniform welding junction is performed, without enough becoming possible [ heat adhesion at low temperature 3-4 degrees C or less ] for the heat-adhesive fiber of this invention, and a fiber join producing welding junction nonuniformity as compared with the bicomponent fiber of the usual round-head cross section as shows excelling in the low-temperature adhesive property as used in the field of this invention to drawing 5 . Consequently, many openings between fiber remain and the nonwoven fabric obtained by carrying out low-temperature heat treatment using the heat adhesive property bicomponent fiber of this invention

has a feeling of software extremely. And since thermal melting arrival of the fiber is certainly carried out at a fiber contact, a nonwoven fabric raises the bonding strength as the fiber aggregate, and comes to have high strength. On the other hand, the sheath-core bicomponent fiber of round-head cross-section structure general like drawing 5 takes an elevated temperature more as compared with the case of the bicomponent fiber of this invention, in order to fully carry out melting of the whole sheath component. If heat treatment is performed under such conditions, the strength by thermal melting arrival will improve, but in order that a opposite side heart component may also approach welding temperature, it comes to carry out welding of the whole fiber. Consequently, bulky is lost inevitably and the aesthetic property (tactile feeling of software) of a nonwoven fabric is spoiled.

[0017] Moreover, since the heat adhesive property bicomponent fiber of this invention has the many leaf type structure where the strand extended from a center section to a radial toward an outside branched, the reflected light on which incident light was scattered comes to be visible [ a bicomponent fiber ] to a visual field. Therefore, when the heat adhesive property bicomponent fiber of this invention is made into textiles, such as a nonwoven fabric and woven knitted goods, the so-called lack-of-hiding prevention effectiveness which cannot be seen easily is demonstrated. That is, it excels in concealment nature.

[0018] In order to obtain the heat adhesive property bicomponent fiber of this invention, in the case of a staple fiber, spinning is carried out by the well-known compound spinning method using the spinneret plate represented in above-mentioned Resin A and above-mentioned B component in an above-mentioned fiber cross section. Under the present circumstances, Spinning MFR is adjusted by changing the extrusion temperature of A and B component, and the contact rate of a tee and a connection is set up. Then, it extends and crimp is given. A component / B component =20 / 80 - 80/20% of the weight of range has [ A and B component which constitute a bicomponent fiber ] a desirable compound weight ratio. It becomes difficult for the heat adhesive property of the fiber obtained to fall at less than 20%, and for B component to acquire tensile strength also with the sufficient nonwoven fabric using this and a low-temperature adhesive property. Moreover, although the heat adhesive property of fiber is enough if B component exceeds 80%, the rate of a heat shrink of fiber becomes high, and there is an inclination for the dimensional stability at the time of obtaining a nonwoven fabric to fall. The fineness of a bicomponent fiber has that good whose numbers of crimps it is 0.5 - 10.0 d/f, and are about three to 60 crest / 25mm, and its card permeability is [ that ] desirable. On the other hand, as a representative of continuous glass fiber, above-mentioned Resin A and above-mentioned B component can be manufactured by the well-known span bond method using the spinneret plate represented in an above-mentioned fiber cross section. Under the present circumstances, Spinning MFR is adjusted by changing the extrusion temperature of A and B component, and the contact rate of a tee and a connection is set up. A compound weight ratio has [ A and B component which constitute a bicomponent fiber ] desirable A component / B component =20 / 80 - 80/20% of the weight of range. It becomes difficult for the heat adhesive property of the fiber obtained to fall at less than 20%, and for B component to acquire tensile strength also with the sufficient nonwoven fabric using this and a low-temperature adhesive property. Moreover, although the heat adhesive property of fiber is enough if B component exceeds 80%, the rate of a heat shrink of fiber becomes high, and there is an inclination for the dimensional stability at the time of obtaining a nonwoven fabric to fall. The fineness of a bicomponent fiber has a 0.5-10.0d [/f ] desirable thing. Moreover, crimp can also be given if needed.

[0019] The staple fiber nonwoven fabric of this invention can be obtained by the well-known approach of using the above-mentioned bicomponent fiber as the web of desired eyes using a carding machine, and using as a nonwoven fabric by the needle punch method, the suction dryer method, or the hot calender roll method. On the other hand, as a representative of a continuous glass fiber nonwoven fabric, it can obtain by the well-known approach of using as a nonwoven fabric by the span bond method. Such a nonwoven fabric is useful in fields, such as facing of a disposable diaper or a sanitary napkin. When using this nonwoven fabric for a disposable diaper, a sanitary napkin, etc., the superintendent officer of 0.5 - 10.0 d/f and a nonwoven fabric has the

desirable thing of 8 – 50 g/m2, and single-yarn fineness is 10 – 30 g/m2 more preferably. Since it becomes difficult to attach and to obtain a homogeneous web that the spinnable properties in which it was stabilized at the time of spinning by single yarn in less than 0.5 d/f are hard to be obtained, and the eye of a nonwoven fabric becomes coarse, and it will become what has difficulty in the touch if this is used as facing if 10.0 d/f is exceeded, it is not desirable. Moreover, a superintendent officer is too thin in less than two 10 g/m, and if 50 g/m2 is exceeded, although sufficient nonwoven fabric strength is not acquired, but desirable nonwoven fabric strength will be acquired, the touch is not practical from becoming cost quantity bad.

[0020]

[Example] Although an example explains this invention concretely below, this invention is not limited only to these examples. In addition, various kinds of physical-properties values in the example described below are measured by the following approaches.

[0021] – Photo the cross section of a contact rate nonwoven fabric with an electron microscope photograph, observe the fiber except thermocompression bonding processing having been carried out, and choose ten per one visual field. It is a rate with the perimeter length of the cross section of this low-melt point point resin B component on the same cross section, and according to a degree, the perimeter of the cross section of a part where B component of the low-melt point point resin linked to A component of the high-melting resin which is the tee of a variant cross section has touched makes the average the contact rate per one, and shows a result for the average of ten duties in Table 1.

Contact rate (%) =AP/BTx100AP: Perimeter length of this low-melt point point resin B component on the perimeter BT:same cross section of a part where the low-melt point point resin B component touches the high-melting resin A component [0022] – Cross-section configuration maintenance property : (staple fiber)

if 50 single yarn after extension is photoed by extraction, a fiber cross section is photoed with an optical microscope photograph and the connection configuration of A component of the high-melting resin of a variant cross section and B component of low-melt point point resin is maintained 90% or more in one visual field — A — when were maintained 80% or more and it was good and 80% or less, it estimated that it was improper, and ** showed O and good and x showed the failure for A. A result is shown in Table 1.

– Cross-section configuration maintenance property : (continuous glass fiber)

if the cross section of a nonwoven fabric is photoed with an optical microscope photograph, the fiber except thermocompression bonding processing having been carried out is observed and the connection configuration of A component of the high-melting resin of a variant cross section and B component of low-melt point point resin is maintained 90% or more in one visual field — A — when were maintained 80% or more and it was good and 80% or less, it estimated that it was improper, and ** showed O and good and x showed the failure for A. A result is shown in Table 1.

[0023] – Concealment nature (whiteness degree of a web)

Concealment nature is so high that measurement and a numeric value are large in web 10g at extraction and a color difference meter (SM color computer and Suga Test Instruments Co., Ltd.). A result is shown in Table 1.

– Concealment nature (light-and-darkness difference of a nonwoven fabric)

Using the nonwoven fabric created in nonwoven fabric strength, a white tile and a black tile are placed behind this nonwoven fabric, lightness is measured with a color difference meter, and the smaller thing of calculation and a light-and-darkness difference has concealment nature higher than the following formula in a light-and-darkness difference (**L). A result is shown in Table 1.

Light-and-darkness difference (**L) =L*W-L*BL*W: Lightness when putting a nonwoven fabric on the lightness L*B:black tile when putting a nonwoven fabric on a white tile [0024] – Nonwoven fabric strength : the flow direction (MD) of the machine of a nonwoven fabric was made into the die-length direction, the test piece with a die length [ of 15cm ] and a width of face of 5cm was produced by having made the direction (CD) right-angled to the flow direction of a machine into the cross direction, and tension strength was measured by grip spacing of 10cm, and tension rate 10 cm/min using the tension tester.

- Nonwoven fabric hand : the organoleptics by five persons' panelist were performed and it estimated that the case where the case where the case where it is judged that all the members are soft is judged that A and more than trinominal are soft is judged that good and more than trinominal lack in a feeling of software was improper, and ** showed O and good and x showed the failure for A.

[0025] Heat-sealing nature : - Make into the die-length direction the flow direction (MD) of the machine of a nonwoven fabric to the nonwoven fabric used for measurement of the above and nonwoven fabric strength, and make a right-angled direction (CD) into the cross direction in the flow direction of a machine. A test piece with a die length [ of 7.5cm ] and a width of face of 2.5cm is started. Only die length of 1cm a part for the point of nonwoven fabrics of the same kind Superposition, Thermocompression bonding is carried out at predetermined temperature for 1 second under 3kg/cm2 pressurization, and the exfoliation strength of the heat-sealing section is measured by grip spacing of 10cm, and tension rate 10 cm/min using a tension tester.

[0026] Example 1 and example of comparison 1 consistency sets the high density polyethylene of 13 to 0.959, MI sets it as B component, and MFR uses the crystalline polypropylene (homopolymer) of 10 as A component. The spinneret which gives the thing (example 1) which set the contact rate as the target 20%, and the fiber cross section shown in drawing 5 (example 1 of a comparison) is used using the spinneret which gives the fiber cross section shown in drawing 1 . With compound spinning equipment The compound weight ratios 40/60 (B component / A component) and single-yarn fineness obtained the non-extended yarn of 4 d/f. Then, after having extended 2.4 times with the 95-degree C hot calender roll, giving machine crimp with the Staffa box and drying at 90 degrees C, cutting processing was carried out and the 2dx38mm bicomponent fiber was obtained. Using this bicomponent fiber, using the thermocompression bonding equipment which consists of the temperature of 116 degrees C (example 1), an embossing roll of 24% of heights area heated by 120 degrees C (example 1 of a comparison), and a flat metal roll, the card method web was heat-treated on condition that linear pressure 20 kg/cm and rate 6 m/min, and it considered as the nonwoven fabric of superintendent officer about 20 g/m2. Furthermore, although it excelled in white degree and the touch (feeling of software) and excelled also in nonwoven fabric strength and heat-sealing nature about the example 1 when this nonwoven fabric was used as facing of adult-use paper diapers, about the example 1 of a comparison, white degree was inferior, and nonwoven fabric strength and heat-sealing nature were inferior to the example 1, and the difference in the propriety to absorptivity goods was clear.

[0027] Two to example 3 consistency sets the straight chain-like low density polyethylene of 24 to 0.918, and MI sets it as B component. 3 % of the weight of ethylene, butene-1 Consist of 5 % of the weight and 92 % of the weight of propylenes, and the ternary polymerization object whose MFR is 15 is used as A component. Using the spinneret which gives the fiber cross section shown in drawing 3 (example 2) and drawing 4 (example 3), the contact rate was set as the target 25%, and the 2dx38mm bicomponent fiber was obtained by the same approach as an example 1. Using this bicomponent fiber, using the thermocompression bonding equipment which consists of an embossing roll of 24% of heights area heated by the temperature of 116 degrees C, and a flat metal roll, the card method web was heat-treated on condition that linear pressure 20 kg/cm and rate 6 m/min, and it considered as the nonwoven fabric of superintendent officer about 20 g/m2.

[0028] Example 4 consistency set the high density polyethylene of 13 to 0.959, MI set it as B component, and MFR set up the contact rate lowness by having used the crystalline polypropylene (homopolymer) of 10 as A component using the spinneret which gives the fiber cross section shown in drawing 1 , and obtained the 2dx38mm bicomponent fiber by the same approach as an example 1. In addition, although it was the example from which the example 4 used the spinneret which gives the same fiber cross section as an example 1, and the contact rate of low-melt point point resin became 12% of the perimeter length of this low-melt point point resin, and the improvement in cold working nature was not found so much, it was what is excellent in other properties.

[0029] Example of comparison 2 consistency set the straight chain-like polyethylene of 24 to

0.918, MI set it as B component, the contact rate was set as the target 30% using the spinneret which gives the fiber cross section shown in drawing 2 by having used the polyethylene RENTE phthalate of the IV value 0.49 as A component, and the 2dx38mm bicomponent fiber was obtained by the same approach as an example 1. The A/B component after extension carried out exfoliation division, and this bicomponent fiber was not set as the object of evaluation.
[0030] Example 5 and example of comparison 3 consistency sets the straight chain-like medium density polyethylene of 20 to 0.935, and MI sets it as B component. butene-1 A copolymer is used as A component. the duality whose MFR it consists of 5 % of the weight and 95 % of the weight of propylenes, and is 15 -- What set the contact rate as the target 20% using the spinneret which gives the fiber cross section shown in drawing 1 (example 5), Using a mouthpiece, introduce into the Ayr soccer the bicomponent fiber group breathed out from the spinneret, and towage extension is carried out. and the predetermined fiber cross section shown in drawing 5 (example 3 of a comparison) -- After making electrification equipment give this charge and electrifying said continuous glass fiber group which obtained compound continuous glass fiber, then was discharged from the Ayr soccer, it is made to collide with a reflecting plate, and opens, and uptake of the opened continuous glass fiber group is carried out as a continuous glass fiber web on the endless network-like conveyor which formed the aspirator in the rear face. The continuous glass fiber web which carried out uptake was conveyed while it had been put on the endless conveyor by it, it was heat-treated on condition that linear pressure 20 kg/cm and rate 30 m/min using the thermocompression bonding equipment which consists of an embossing roll of 24% of heights area heated by the temperature of 112 degrees C, and a flat metal roll, and was used as the nonwoven fabric of superintendent officer about 20 g/m2. Furthermore, although it excelled in white degree and the touch (feeling of software) and excelled also in nonwoven fabric strength and heat-sealing nature about the example 5 when this nonwoven fabric was used as facing of adult-use paper diapers, about the example 3 of a comparison, white degree was inferior, and nonwoven fabric strength and heat-sealing nature were inferior to the example 4, and the difference in the propriety to absorptivity goods was clear.
[0031] <<nonwoven fabric strength, a nonwoven fabric hand, the light-and-darkness difference of a nonwoven fabric, and heat-sealing nature>> In a cross-section configuration maintenance property, it evaluates about the sample more than good (**). The staple fiber nonwoven fabric carried out carding of each fiber at the rate of 20 m/min with the roller-card machine, and made it the web of superintendent officer about 20 g/m2, respectively. Then, it was processed into the nonwoven fabric at predetermined temperature using the embossing roll of 24% of rates of adhesion area at the same rate. Each physical-properties result is shown in Table 1. On the other hand, the continuous glass fiber nonwoven fabric was manufactured by the span bond method. About 20g of superintendent officers/and the web of m2 were processed into the nonwoven fabric at predetermined temperature using the embossing roll of 24% of rates of adhesion area. Each physical-properties result is shown in Table 1.
[0032]
[Table 1]

表1

| | レジン組合せ A成分／B成分 | 繊維断面構造 | 接触割合 % | 断面形状維持特性 | 隠蔽性 | 不織布性能（CD強力） | | | | 隠蔽性 | ヒートシール性能 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 白度 | 加工温度 ℃ | 目付 g／m² | 強力 g／5cm | 風合 | 明暗差 ⊿L | 温度 ℃ | 強力 g／2.5cm |
| 実施例1 | PP-1／PE | 図1 | 20 | ○ | 93.5 | 116 | 20.5 | 1200 | ○ | 30.5 | 120 | 2500 |
| 比較例1 | PP-1／PE | 図5 | | | 90.0 | 120 | 21.3 | 900 | △ | 40.8 | 125 | 2200 |
| 実施例2 | PO-2／PE | 図3 | 25 | ○ | 94.0 | 116 | 20.2 | 1100 | ○ | 27.8 | 120 | 2730 |
| 実施例3 | PO-2／PE | 図4 | 26 | ○ | 94.5 | 116 | 20.0 | 1200 | ○ | 27.5 | 120 | 2850 |
| 実施例4 | PP-1／PE | 図1 | 12 | △ | 93.0 | 120 | 20.5 | 1200 | △～○ | 30.2 | 125 | 2700 |
| 比較例2 | PP-1／PET | 図2 | 30 | × | 93.3 | 延伸後の断面形状でA／B成分が分割し、製品として適当でない | | | | | | |
| 実施例5 | PO-1／PE | 図1 | 19 | ○ | 93.0 | 112 | 20.0 | 1300 | ○ | 30.0 | 120 | 3200 |
| 比較例3 | PO-1／PE | 図5 | | | 90.5 | 116 | 20.5 | 1250 | × | 39.0 | 125 | 2700 |

Table 1 -- setting -- pp-1 -- gay polypropylene -- PO-1 -- a propylene/butene-1 -- duality -- a system copolymer -- in PO-2, PE expresses polyethylene and PET expresses polyethylene terephthalate for a propylene / ethylene / butene-1 ternary system copolymer, respectively.

[0033]

[Effect of the Invention] The heat adhesive property bicomponent fiber which has the variant cross section of this invention is low temperature, and can create the big nonwoven fabric of nonwoven fabric strength by short-time heat treatment. Moreover, the nonwoven fabric which used this heat adhesive property bicomponent fiber has soft aesthetic property. And it excels also in concealment nature. Such a nonwoven fabric is useful in fields, such as facing of a disposable diaper and a sanitary napkin.

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[Translation done.]

* NOTICES *



1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]
[Drawing 1] It is instantiation of the fiber sectional view of the heat adhesive property bicomponent fiber of this invention.
[Drawing 2] It is instantiation of the fiber sectional view of the heat adhesive property bicomponent fiber of this invention.
[Drawing 3] It is instantiation of the fiber sectional view of the heat adhesive property bicomponent fiber of this invention.
[Drawing 4] It is instantiation of the fiber sectional view of the heat adhesive property bicomponent fiber of this invention.
[Drawing 5] It is the sectional view of the heat adhesive property bicomponent fiber of the example of a comparison.
[Description of Notations]
1 High-melting Resin Section (A Component)
2 Low-melt Point Point Resin Section (B Component)

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[Translation done.]

* NOTICES *



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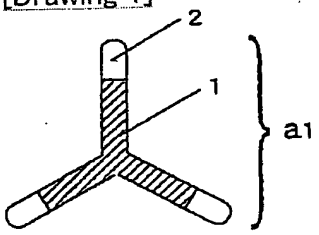
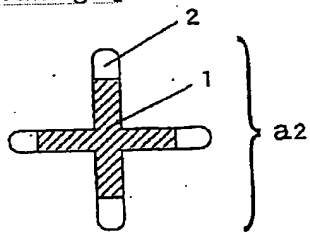
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

## DRAWINGS

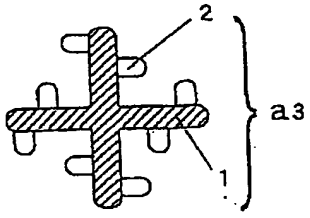
[Drawing 1]



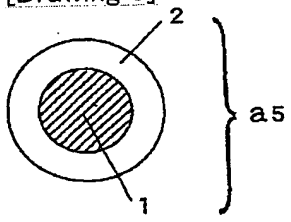

[Drawing 2]



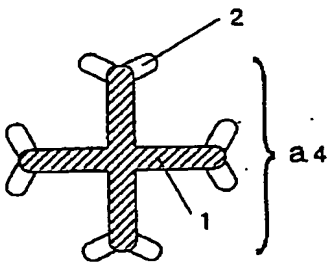

[Drawing 3]




[Drawing 5]




[Drawing 4]

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[Translation done.]